

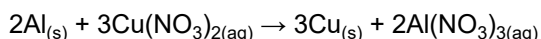
## 1. Academic Integrity Statement:

I agree that I will not use any source of information to assist me on the test other than those approved by the teacher (for this test, **CLEAN copies** of the official GSMST Periodic Table, Reactivity Series and Solubility Rules found on eCLASS; **no other resources are permitted**) and that **I will not offer assistance to nor accept assistance from any other person on this test. I further attest that I have not already accepted help from any other student that has had prior access to this test.**

Please sign (by typing) your full legal name below.

\_\_\_\_\_

## 2. Use the information to answer the following question.



Aluminum, a silver colored metal, is placed in a solution of copper(II) nitrate, which is blue. The reaction produces a reddish brown solid, copper metal, and colorless aluminum nitrate solution.

Beaker Before Reaction	Beaker After Reaction
Blue colored solution	Colorless solution
Silver piece of Al	Small silver piece of Al
	Dark reddish brown solid

**According to the data in the table, what is the limiting reactant? (5 pts)**

- A. Copper(II) nitrate solution, because the solution was blue at the end of the reaction showing some copper(II) nitrate remained at the end of the reaction.
- B. Aluminum, because some aluminum remained at the end of the reaction.
- C. Copper(II) nitrate solution, because the solution was colorless at the end showing it was completely consumed in the reaction.
- D. Aluminum, because it was completely consumed in the reaction.

3. For the reaction  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ , how many moles of water can be produced from 3.0 mol of oxygen? (5 pts)

- A. 2.0 mol
- B. 6.0 mol
- C. 1.5 mol
- D. 12 mol

## 4. The coefficients in a chemical equation represent the \_\_\_\_\_. (5 pts)

- A. number of atoms in each compound in a reaction.
- B. masses, in grams, of all reactants and products.
- C. number of valence electrons involved in the reaction.
- D. relative numbers of moles of reactants and products.

\_\_\_\_\_ 5. In the equation  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$ , how many moles of oxygen are produced when 1.67 mol of  $\text{KClO}_3$  decompose completely? (5 pts)

- A. 1.67 mol
- B. 2.5 mol
- C. 4.5 mol
- D. 3.3 mol

\_\_\_\_\_ 6. For the reaction  $\text{Cl}_2 + 2\text{KBr} \rightarrow 2\text{KCl} + \text{Br}_2$ , the combined number of grams of potassium chloride and bromine produced from 300. g of chlorine and 300. g of potassium bromide will be \_\_\_\_? (5 pts)

- A. answer cannot be determined from the information given
- B. more than 600. g
- C. less than 600. g
- D. 600. g

\_\_\_\_\_ 7. To determine the limiting reactant in a chemical reaction involving known masses of A and B, one could first calculate \_\_\_\_\_. (5 pts)

- A. the bond energies of A and B.
- B. the mass of 100 mol of A and B.
- C. the total mass of all products.
- D. the number of moles of B and the number of moles of A available.

8. In the formation of carbon dioxide from carbon monoxide and oxygen, how many moles of oxygen gas are needed to react completely with 13.0 moles of carbon monoxide ?

- Type your answer as numbers ONLY.
- The units will be assumed to be correct.
- Show ALL work as instructed on a separate sheet of paper.
- Round your answer to 3 significant figures.

(10 pts)

9.  $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$

How many moles of water can be produced from 14.7 moles of ammonium nitrate?

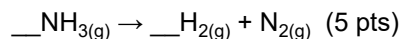
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(5 pts)

\_\_\_\_\_ 10. In the reaction  $2\text{Al}_2\text{O}_3 \rightarrow 4\text{Al} + 3\text{O}_2$ , what is the mole ratio of oxygen to aluminum oxide? (5 pts)

- A. 6:2
- B. 4:6
- C. 3:4
- D. 3:2

\_\_\_\_\_ 11. When the reaction below is balanced, what is the mole ratio of ammonia to hydrogen?



- A. 3 mole  $\text{NH}_3$ /2 mol  $\text{H}_2$
- B. 2 mole  $\text{H}_2$ /3 mol  $\text{NH}_3$
- C. 1 mole  $\text{NH}_3$ /3 mol  $\text{H}_2$
- D. 3 mole  $\text{H}_2$ /2 mol  $\text{NH}_3$
- E. 2 mole  $\text{NH}_3$ /3 mol  $\text{H}_2$

\_\_\_\_\_ 12. What is the maximum possible amount of product obtained in a chemical reaction? (5 pts)

- A. percent yield
- B. actual yield
- C. mole ratio
- D. theoretical yield

\_\_\_\_\_ 13. What is the ratio of the actual yield to the theoretical yield, multiplied by 100%? (5 pts)

- A. excess yield
- B. Avogadro yield
- C. percent yield
- D. mole ratio

\_\_\_\_\_ 14. In the chemical equation  $w\text{A} + x\text{B} \rightarrow y\text{C} + z\text{D}$ , if one knows the mass of A and the molar masses of A, B, C, and D, one can determine \_\_\_\_\_. (5 pts)

- A. the total mass of C and D only.
- B. the mass of any of the reactants or products.
- C. the total mass of A and B only.
- D. the mass of B only.

\_\_\_\_\_ 15. A chemist performs the synthesis of magnesium chloride from its elements. The chemist begins with 97 grams of Mg. How many moles of chlorine are needed? (5 pts)

- A. 4.0
- B. 1.0
- C. 3.0
- D. 2.0
- E. 0.50

\_\_\_\_\_ 16. If one knows the mass and molar mass of reactant A and the molar mass of product D in a chemical reaction, one can determine the mass of product D produced by using the \_\_\_\_\_. (5 pts)

- A. group numbers of the elements of A and D in the periodic table.
- B. estimating bond energies involved in the reaction.
- C. mole ratio of D to A from the chemical equation.
- D. electron configurations of the atoms in A and D.

17. What mass of carbon dioxide (44.01 g/mol) can be formed by the decomposition of 14.60 g of aluminum carbonate (234.26 g/mol)? The products are aluminum oxide (101.96 g/mol) and carbon dioxide.

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(15 pts)

18. If 0.2509 moles of iron(II) sulfate (151.92 g/mol) in solution is combined with an excess of sodium hydroxide (40.00 g/mol) how many grams of precipitate are formed?

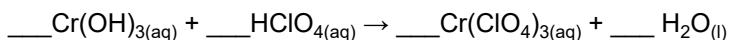
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(20 pts)

19. What is the limiting reactant when 10.00 g of zinc metal is placed in a beaker containing 60.00 g of lead(II) nitrate (331.22 g/mol)? (15 pts)

- A. lead(II) nitrate  
B. water  
C. zinc  
D. The reaction does not occur.  
E. zinc nitrate

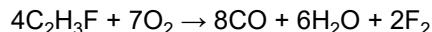
20. If 281.0 mL of water (18.02 g/mol) were produced, how many grams of chromium(III) hydroxide (103.03 g/mol) were used? (HINT: The density of water is 1.00 g/mL.)



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(10 pts)

21. For the balanced equation shown below, if the reaction of 47.2 grams of O<sub>2</sub> produces 19.2 grams of H<sub>2</sub>O, what is the percent yield?



- Type your answer as numbers ONLY, no % sign.
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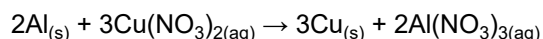
key 1

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answers vary

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**B**

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(10 pts)

6.50

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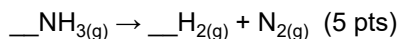
29.4

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(15 pts)

8.229

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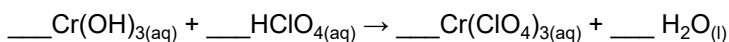
22.5

     C

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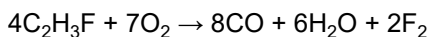


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(10 pts)

535.5

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(10 pts)

84.3



